

Transforming a first programming course – some critical aspects

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In a first programming course, where students from engineering, computer science and economics learn how to program, one difficulty has been to make the students continue throughout the course. One problem may be that “novices are often expected to perform many of the activities[...] at an early stage of their education.” (Eckerdal, 2009, p. 58)

In the revised course the syllabus has been divided into four parts; problem solving strategies, coding, event driven programming and a small programming project. After each section oral examinations with groups of four students were held. These examinations have been a helpful tool in how to facilitate for students to get “unstuck” (McCartney et. al. p. 156). The teachers’ notes from these examinations, were analyzed, and taken into account for the following part of the course.

One threshold concept candidate could be functions or methods, and we wanted to find out whether this is a threshold or whether problems with this concept is due to the way this concept usually is dealt with, a rather complex concept taught very early in a course. Most earlier research has dealt with other concepts e.g. objects and class, but to isolate methods and investigate what it takes to learn to understand and use methods is not common. With our new approach we could see if variation in presenting the concept would lead to a better understanding. By dealing with methods first in the “problem solving strategy-part” we could deal with the aspect of dividing the problem into smaller pieces, next we could deal with the aspect of passing values or references into or out of methods, and by repeating both of these while working on event driven programming we could investigate how students may focus on these aspects simultaneously (Marton, Tsui, 2004).

We can see that novice students at the beginning of the course do not at all appreciate “methods” as a way of dealing with problem solving. However, our research shows that students who have problems with “methods” when they are first introduced to this concept gradually go from mimicry to a more expert-like way of dealing with methods. We can also see that some students still have not come to an expert-like view, but that those students use strategies that are similar to those shown in relevant earlier research on students going “From *limen* to *lumen*” (see e.g. Paper VIII in Eckerdal, 2009)

Our preliminary conclusion is that using intermediate examination data to find ways to vary the aspects of a threshold concepts when revisiting a concept, like “methods”, can help students pass the liminal space.

A suggestion for further research, also in line with research by Eckerdal (2009), in this area would be to study how different aspects of a concept, e.g. problem solving, syntax, patterns, programming paradigms, can help students find paths through the liminal space.

References:

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